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For Companies Today, the Question Is Not Whether to Move to the Cloud but How

Large companies worldwide are moving their IT applications and infrastructure to the cloud, recognizing that creating innovative products and services and developing key strategic differentiators depends on the enormous computational resources that can be leveraged only through third-party cloud vendors.

This trend represents a shift in thinking about how and why companies deploy cloud computing. Previously, migrating to the cloud was considered a tactical play—a way to reduce IT costs and transform sunken capital expenditures into pay-as-you-go operating expenses. Today, moving apps and other IT systems to the cloud is viewed increasingly as a business-growth imperative, essential to revenue generation, competitive differentiation and meeting the requirements of agility, flexibility, scalability, availability.

There are many critical functions that cannot be implemented without the huge, round-the-clock computational resources of major public cloud vendors such as AWS, Microsoft or Google. And the cloud has become essential to helping companies offer a superior digital customer experience. Given that moving a business's IT to the cloud is a massive and complex effort, many companies struggle with where to begin. They must decide the order in which applications should be migrated. They must also determine whether proprietary information and sensitive data (especially customer data) should reside in a public, private or hybrid cloud—a question that has become increasingly fraught given the new and strict consumer privacy laws recently enacted in Europe and other countries.

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Why tactical lift-and-shift cloud migration is inadequate

In the past, CIOs intended to take an IT-driven approach to cloud migration. The initial focus was on cost and the movement started with a lift and shift approach of moving tasks from on-premises systems to the cloud.

This tactical approach is not optimal because it is based on creating IT efficiencies rather than building strategic digital capabilities that can provide competitive advantages. Companies that lift-and-shift are addressing their existing challenges, but they are not considering the vast possibilities cloud systems offer, like application modernization, digital transformation and data monetization.

As an example, many companies attempt to modernize their systems by retaining their legacy mainframe and building an API layer on top of it, thereby accepting the limitations of the underlying system to respond to the needs of modern business. On the other hand, one major U.S. healthcare business is modernizing its sales and marketing applications by replacing its mainframe applications with Java-based applications using a microservices architecture in the cloud and thereby responding to the market needs of agility, flexibility and scalability.

Customer Example

A media-analysis firm uses microservices to boost agility

A leading media analysis and measurement firm needed to adapt to rapidly changing media consumption trends—including the rising utilization of mobile devices—to meet the needs of its clients. With the proliferation of digital technologies, it had been challenging to understand buyer preferences in digital channels. To address this, the company conceived a system with round-the-clock listening services capturing consumer data from a variety of digital channels and social media.

To do so, it deployed a loosely-coupled, modular microservices-based architecture enabling efficient data processing on multiple nodes. The system is inherently scalable and reliable, leveraging AWS[1] RabbitMQ[2] (an open-source message broker for cloud applications), and Redis[3] (an open-source technology that supports automated database applications in the cloud).

This cloud-based system supports 200,000 concurrent users with data measurement every 10 seconds. It models around domain boundaries to reflect changes in business processes and is highly scalable with the ability to handle large volumes of measurement data.

[1] Amazon, What is Docker? accessed July 23, 2018, https://aws.amazon.com/docker/
[2] RabbitMQ, RabbitMQ is the most widely deployed open source message broker accessed July 26, 2018, https://www.rabbitmq.com/
[3] Redis accessed July 15, 2018, https://redis.io/topics/introduction
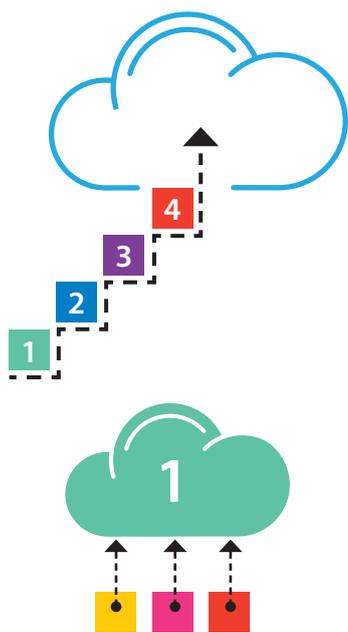
Four Strategic Steps to Cloud Migration

Rather than lifting-and-shifting to save on IT overhead, companies should move away from their limiting legacy systems by re-architecting and transforming monolithic applications to a digital core.

Implementing a cloud-empowered digital transformation entails four steps: creating a strategy, devising an appropriate architecture, developing a migration roadmap and cloud migration.

Step 1: Establishing a Business-Driven Cloud Strategy

To develop a winning cloud-empowered strategy, executives need to identify applications and initiatives that that will drive company-wide success. Business drivers include risk, the competitive landscape, urgent business needs, growth opportunities, innovation as a differentiator, and the potential for developing new lines of business. Executives also need to examine cloud migration in terms of "as-is versus the target state," prioritizing both immediate opportunities and critical digital transformation needs.

Achieving digital maturity should be a key goal for cloud migration strategies. With the proliferation of new, critical and powerful technologies, digital maturity is essential for aligning the business with transformative business model operations, such as those deployed by Uber and Airbnb, and modernized processes adopted in the transportation and finance sectors with, respectively, automated booking and mobile banking. Digital maturity consists of building new cloud-native capabilities, transforming the architecture and leveraging business and contextual knowledge.

Executives should also examine new data opportunities unleashed in the cloud by exploring the possibilities to leverage data as an asset. For example, by working within a partner ecosystem, a company can expose data in a secured manner and regulatory compliant manner to monetize data. Leveraging cloud-native technologies can reveal new revenue streams, fueling business growth. Banks, for instance, are using data for creating expanded (and profitable) customer service ecosystems, while

information services companies are leveraging cloud-native technologies to capture their target audience and measure the effectiveness of marketing campaigns. Hyper-growth is only possible with a clear digital agenda, a platform-based approach, multi-cloud integration, API implementation and microservices.
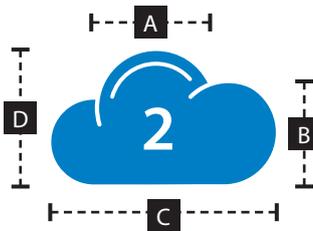
Step 2: **Defining the Optimal Architecture**
Once the strategy is established, the company should turn its attention to cloud architecture. Defining an optimal architecture ensures that cloud migration is executed in a way that matches the business strategy with regulatory compliance and data security constraints, among others. Depending on these constraints, the right architecture may be public, private, or a hybrid approach. Key factors to consider include needs for agility, scalability, availability, data sensitivity/risk profile, innovation, time to market and cost.

For example, a healthcare company or financial institution may maintain customer data in a private cloud to ensure the privacy and security of sensitive, regulated data and move some of the applications to a public cloud. In contrast, a retailer may prioritize the ability to scale up and down quickly as demand fluctuates, such as at holiday peak times, and leverage a public cloud. For online services such as Netflix or Hulu, the most important consideration may be availability and failover to prevent customer-frustrating outages; they may need a microservice-based architecture with redundancy to ensure smooth functioning. In industries like pharma, where innovation is critical, the cloud applications with a serverless architecture may deliver the ability to process and analyze data more quickly to meet business needs.

Architecture may also address such factors as how to consolidate data processing from disconnected entities, and how to avoid getting locked into any single cloud vendor's platform. Or, it may address the need for geo-replicated solutions, addressing regional regulatory compliance demands. For example, a pharmaceutical company may design its cloud architecture to support a globally distributed access-management solution, with variations to ensure compliance with a complex variety of regional regulations.

Companies should move away from their limiting legacy systems by re-architecting and transforming monolithic applications to a digital core.
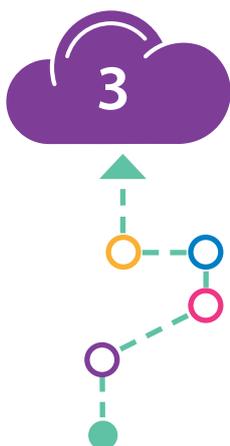
Step 3: **Creating the Roadmap**

In addition to a business-driven strategy and an architecture that conforms with a business's needs and market constraints, companies should develop a roadmap that ensures a seamless migration to the cloud. The roadmap incorporates such factors as how to implement migration with minimal impact on business units or on currently operating IT systems. It also identifies strategies to follow for analytical applications (such as in data lakes) and addresses how to handle commercial off-the-shelf applications, such as a company's ERP system.

In practice, companies tend to address cloud-based modernization roadmaps via one of the following four approaches:

- **Savings first, modernization later.** In this case, the company's priority is cutting costs. Migrate the cost-intensive applications and resources to the cloud first and free up the overhead costs of data centers. Consider the modernization of specific applications at a later stage based on specific business needs.

This path is usually taken due to constraints such as limited resources, security concerns, or change management considerations. This roadmap is typically chosen by companies with mid-size application footprints, mostly in the retail, hospitality, travel and insurance sectors.

- **Modernization first, then business model transformation.** This roadmap seeks to use the cloud to leverage technological advances to drive current business improvements that transform the business model. This roadmap is often chosen by companies with a small application footprint but a strong digital agenda.

The banking and financial services industry sees this approach playing out. For example, a Nordic bank has modernized its payment applications and transformed the business model leveraging microservices and an API-based architecture. A major European bank, meanwhile has responded to its market conditions—including competition from fintechs, as well as new regulatory requirements—by seeking to future-proof itself with a transformational digital banking strategy. It is leveraging cloud APIs to create a common ecosystem with partners and other fintechs, driving third-party innovation that benefits the bank and its ecosystem partners. In so doing, the bank has defined the future-state architecture for API banking.

Companies should develop a roadmap which incorporates such factors as how to implement migration with minimal impact on business units or on currently operating IT systems.

Its business goals include increasing agility, reducing time to market, creating new revenue streams, and enabling new business models.

- **Entering the cloud through data services.** Organizations with data lakes and heavy analytical applications are planning to leverage the cloud to modernize their analytical applications. Here, the roadmap begins with modernization and movement to the cloud of their analytical applications. The remaining applications may stay on-premise or move to the cloud based on a firm's overall cloud strategy.

For example, a major European postal services company has devised a strategy to move their business intelligence applications along with the data marts holding more than 50 Terabytes of data to the public cloud and connecting its on-premise applications through a dedicated data pipe. The strategy for migrating the other applications will be framed parallel to the above initiative.

- **Enabling a superior last-mile experience.** Some businesses with heavy monolithic and legacy commercial off-the-shelf systems (such as ERP and CRM) are looking at the cloud to enable state-of-the-art user experiences for their business with a mobile layer on top of their existing application landscape.

For example, a government insurance business based in the Middle East has leveraged cloud-native technologies to build a mobile user interface for a selected set of their commercial off-the-shelf functionalities.

Customer Example

A bank uses "APIfication" for innovation

A leading European bank implemented an APIfication strategy to innovate more quickly and lay the groundwork for a series of new customer-facing apps. There were three business drivers for this. First, to adopt new digital banking business models with a partner ecosystem. Second, to take a leadership position in a changing landscape with increasing competition from fintechs. Third, to comply with the European Union's revised payment services directive, PSD2.

The solution included designing an API banking architecture, comprised of high-level architecture, process flows, security and data models. It leveraged Apigee,[4] a Google API platform, and node.js, an open-source server environment.

The project established an ecosystem to work with partners and fintechs, to drive innovation. It also created new business models and revenue streams, while complying with PSD2 regulations.

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[4] Apigee, accessed July 15, 2018, https://apigee.com/api-management/#/about-us

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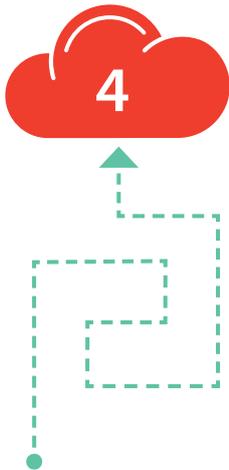
Step 4: Choosing the Path to Cloud Migration

Effective deployment of the cloud strategy and roadmap ensures success of the cloud migration initiative. There are three varieties of cloud migration: low touch, high touch and modernization, as illustrated in Figure 1 below.

Figure 1: Low Touch, High Touch and Modernization Paths to Cloud Migration
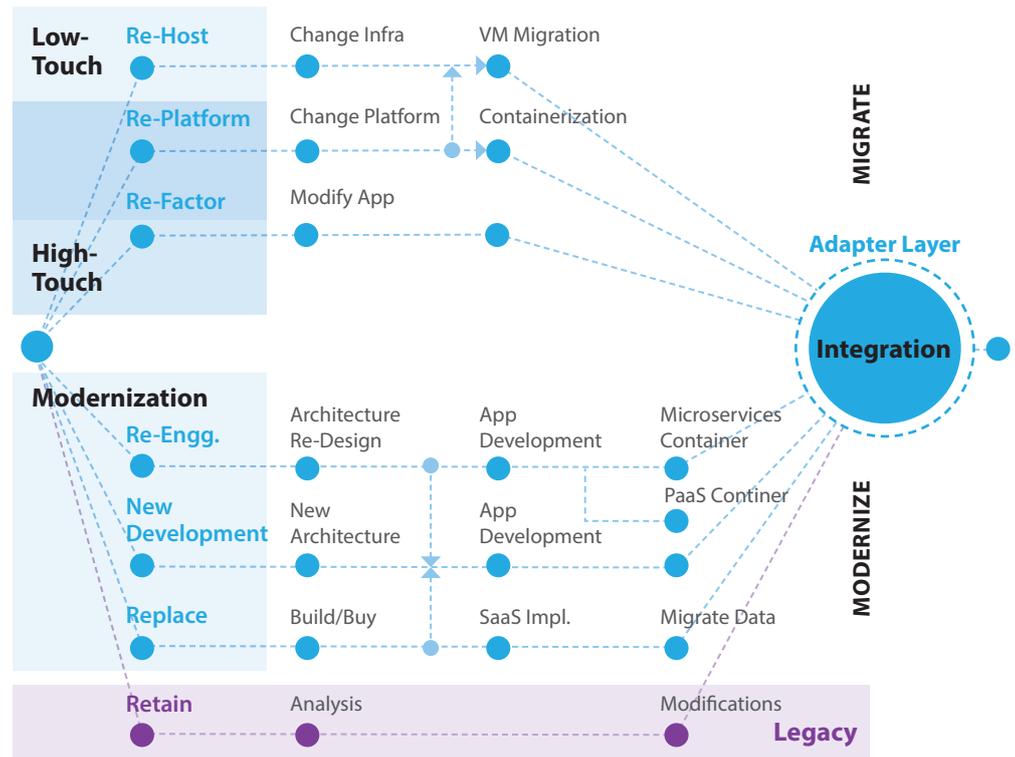
Low touch migration deals with the lift and shift of applications to the cloud. It involves low-risk, highly automated, catalogue-based migration services of applications and data. This approach has a rapid scale up capability.

High touch migration involves refactoring of applications (i.e., they can be moved to the cloud with configuration changes and minor modifications) or re-platforming of applications (i.e., they can be deployed on different operating systems with minor modifications). It requires a configurable, variable, application-specific approach with strong transparency in terms of the costs and timeline to completion.

Application modernization services includes applications reengineering, new development and is artisanal in nature. This leverages what we call Business 4.0 principles—the fourth industrial revolution in which successful businesses will use people, technology and data to be intelligent, agile and automated, and on the cloud.
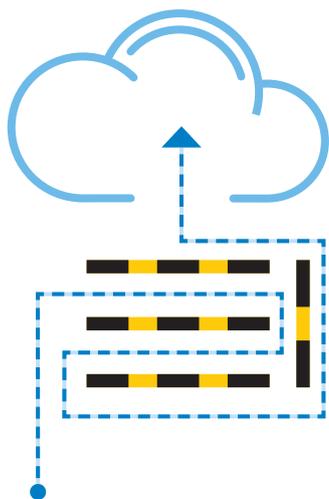
Not Easy, But Worth It

Implementing a cloud-empowered business modernization effort is a major undertaking for any company. It will affect nearly every aspect of the business, from front-end customer-facing applications and processes to back-end financial and inventory systems. As such, there are key barriers that every company must overcome to be successful.

Not surprisingly, the effort will demand careful planning to create an appropriate strategy, architecture and roadmap. A company, no matter its size, must be prepared to rethink how it addresses its key business drivers. Based on that, it must develop and execute the plan over the course of months and commit sufficient resources to the effort. Perhaps most importantly, the company must create a leadership team with broad support and participation from the C-suite, operations and affected business units, as well as from the tech team. It must avoid allowing the IT team to drive the process based on its (or the company's) tactical, short-term needs. A shared vision and thorough buy-in from all these stakeholders ensures the best possible outcome.

Once the plan is agreed to, the company must verify that it has the requisite tech capabilities (and talent) to work with its chosen vendor to develop, test, and implement the project without compromising its ongoing operations. And it must do its due diligence to be sure that the vendor has the experience and capacity to help engineer an optimal transformation that will prepare the company for a cloud-driven future.

To help clients achieve their digital transformation, the vendors should provide a portfolio of methodologies. It must have decision, migration and modernization services to help the company achieve its digital transformation with a set of automated accelerators, in a

Customer Example

An airline uses a hybrid cloud integration to manage schedules

A leading U.S. airline deployed hybrid integration to plan crew schedules. The business drivers included the need to manage multiple sources of crew information across various domains (crew profile, planning and operations) for various channels, and keeping up with Federal Aviation Administration (FAA) rules.

The airline's solution entailed an enterprise-wide platform for integrated crew domain information. It eliminated point-to-point communication and tight coupling between systems, and published services for users leveraging a cloud-based integration platform-as-a-service (iPaaS). The system enabled the airline to establish automated business rules. Via this cloud solution, the crew can manage its own activities more efficiently (and within regulations), with operations using multiple channels to oversee their activity.

factory-delivery model. And it must offer a full range of capacities to implement microservices, serverless architecture, containers, ecosystem intermediation, and hybrid integration.

Finally, it must possess business-context knowledge to help customers achieve their application transformation and capture new opportunities.

Once cloud migration is complete, companies must be organized to innovate and iterate continuously lest the point of the migration be missed. With a well-designed cloud-based digital transformation, future innovations will be far easier and quicker to implement.

A Business Imperative

Technology is reshaping the world of commerce in profound ways. Companies like Amazon, Lyft, Google and Netflix are redefining customer expectations, and those expectations now apply across their interactions with all industry sectors, from hospitality to banking, from transportation to entertainment. Customers expect all their interactions to be seamless; they expect the companies with which they interact to respond to them quickly, knowing who they are and the history of their past transactions.

Only cloud-based solutions offer the agility and power needed to accomplish that. We believe that there is simply no way to compete in the modern business world without embracing the cloud and capitalizing on its potential for digital transformation. Call it future-proofing the business. Companies ignore the cloud at their peril, and those who embrace it early and most effectively will be prepared to deliver a superior customer experience while benefiting from a host of operational improvements.

As we have stressed, the key to successfully deploying cloud solutions is developing a strategy, architecture and an implementation roadmap that incorporates the company's vital business interests and drivers. If the company has not already done so, establishing a cross-functional team with the authority and capacity to carry out the cloud-empowered strategic transformation is an urgent business imperative.

Companies who embrace cloud early and most effectively will be prepared to deliver a superior customer experience while benefiting from a host of operational improvements.

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